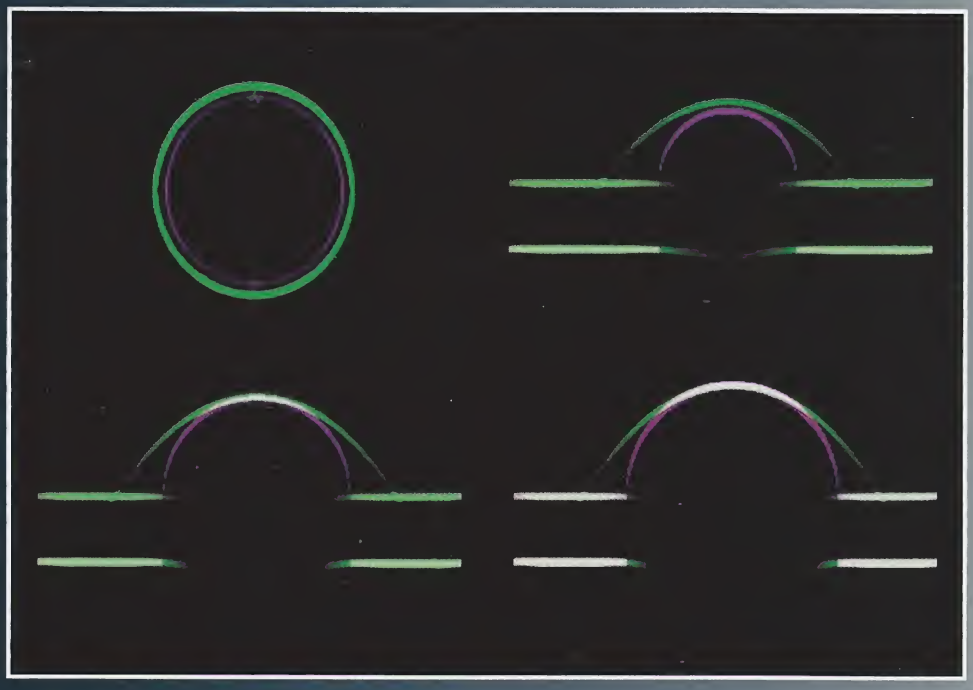
The Imagined Becomes a Reality...



Seismic Migration

Three-dimensional migration on Cray supercomputers is a reality today. Several methods of 3-D migration are currently running on Cray computers. The ability to migrate seismic data in all three spatial dimensions allows the elimination of the distorting effect of the 3-D geology, allowing a greater flexibility in Seismic Data Interpretation. Effects such as side-swipe and multiples can be eliminated in an accurate quantitative fashion.

The images in the upper left frame represent the seismic model as purple, and the seismic response of the 3-D model as green.

The model has 2 layers with a cylindrical structure, topped by a dome piercing the two layers. This is an "acoustic" model, meaning the colors represent the pressure in the wave field. The slices are, in clockwise order, starting from the upper left, a horizontal slice through the dome structure, followed by a series of three vertical slices throught the dome structure. The third vertical slice is through the center of the dome. Although this model has a cylindrical symmetry, the method used is not restricted to such geometries.

The pressure wave caused by the reflections of the structures is represented in blue. Notice the deformation of the wave under the dome, and the spreading of the wave around the dome. The pressure wave alone does not give a true picture.

The lower picture is an example of the pressure waves after migration. Migration is a process which should restore the correct spatial perspective in seismic sections such as those described above. The four slices are as descibed above, except that the migrated wave field is substituted for the model. The color code in this case is red for the pressure field before migration, and blue for the pressure field after migration. A comparison of the model as shown in the top frame with the migrated data as shown in the bottom frame shows how well the migration algorithm has eliminated the spatial distortions.

The true power of Cray supercomputers is especially apparent with complicated algorithms. The Cray advantage in memory size, computational speed, and input/output efficiency makes Cray supercomputers the machines of choice for 3-D migration. As the seismic algorithms grow in complexity, only a general purpose machine like a Cray supercomputer can efficiently model the 3-D geology with timely, accurate results.

Cray Research has had a long and successful history of cooperating with major oil companies, researchers, and contractors in executing and optimizing seismic processing, seismic modeling, and reservoir simulation programs

Three-dimensional migration of seismic data has become a reality on Cray supercomputers.

Credits: Jing Weng and George McMechan of the University of Texas at Dallas.

Making the Imagined a Reality. . .

Making the imagined a reality has become commonplace using Cray supercomputers. Previously insolvable problems in the aerospace, petroleum, and automotive industries and in science, engineering, and graphics are being solved today using the power and flexibility of Cray supercomputer systems. In each discipline the Cray supercomputer is used to simulate a real-world process in less time and at less cost.

To support these applications, a wide range of graphic software systems is offered for Cray supercomputers by third-party vendors. Device-independent line-drawing systems like GK-2000 and DI-3000 from Precision Visuals, Inc., TEMPLATE from Megatek, Inc., and DISSPLA from ISSCO, Inc., are being used now on many Cray supercomputers.

Systems for CAD/CAM and pre- and postprocessing like PATRAN from PDA Engineering and MOVIE.BYU from Brigham Young University support a variety of engineering design activities. In those cases where photographic-quality scene generation is the objective, the designers, artists, scientists, and movie-makers are turning to Cray systems to do what could not otherwise be done.

If your application or graphics task requires extraordinary computer power . . . the problems you **can** do are much smaller than the problems you **would** like to do . . . if you need a general purpose powerhouse to run a variety of simulation, engineering, or scientific codes . . . you need a Cray supercomputer!

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